

Name:

We will not be performing the "Freezing Point Depression" lab as scheduled. Instead, you will be required to complete the following three questions on your own or with a study partner(s). Use this worksheet to answer the problems; failure to use this worksheet can result in a point penalty.

You must show all work and circle final answers to receive credit. This lab is due at the regularly scheduled time for the Freezing Point Depression lab.

1. Graph the following data on Excel or a similar computer program (hand drawn graphs will not be accepted for credit.) Use **Time (minutes)** as your x-axis and **Temperature °C** as your y-axis. You will have two different data streams ("**PDB**" and "**Solution I**" which use a common set of axes; use a color or point marking system to differentiate "PDB" from "Solution I". Attach the graph to the back of this handout.

<u>Time (minutes)</u>	<u>PDB (deg C)</u>	<u>Solution I (deg C)</u>
0.5	63.7	61.3
1.0	62.1	59.7
1.5	60.8	58.2
2.0	59.1	56.5
2.5	57.5	54.8
3.0	55.8	53.4
3.5	54.0	52.0
4.0	53.0	50.8
4.5	53.0	50.2
5.0	53.0	50.2
5.5	53.0	50.2
6.0	53.0	50.1
6.5	53.0	50.0
7.0	53.0	50.0
7.5	53.0	49.9
8.0	53.0	49.8
8.5	53.0	49.7

2. On your graph, determine the freezing point for the "PDB" and "Solution I" curves. Look for the spot where two lines (of different slopes) converge; this is the official freezing point of the compound. **Mark the graph at the freezing point**, and enter the actual numbers below.

Freezing Point of PDB (°C): _____ **Freezing Point of "Solution I" (°C):** _____

Freezing Point Depression take-home lab *continued*

3. The "PDB" for your graph stands for "para-dichlorobenzene". Draw the structure of PDB here.

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4. Using the information found in problems #1 - #3, **determine the molar mass of the solute** in "Solution I" if **2.35 g** of the unknown compound were dissolved in **30.46 g** of PDB. (k_f for PDB = **7.10 °C/m**) *Show work!*

Molar mass of solute: _____

5. Determine the effect of the following on the final molar mass calculation in a freezing point depression experiment. *Briefly* give your reasoning. Indicate if the effect on molar mass will be **higher**, **lower** or **not change**.

- i. The thermometer you were using read temperatures consistently 1.2 °C higher than the real temperature.

Effect on molar mass:

Explain:

- ii. You added 3 g of unknown solute during your freezing point determination instead of 2 g.

Effect on molar mass:

Explain:

- iii. In adding your unknown solute to your solvent, you spilled some solute onto the table after weighing.

Effect on molar mass:

Explain: